NOTES ON THE GENUS *CLERODENDRUM* (*VERBENACEAE*). V

Harold N. Moldenke

CLERODENDRUM Burm.

Additional synonymy: *Clerodendrom* Schau. apud Boorsma, Meded. Lands Plant. 31: 7 sphalm. 1899.

Additional & emended bibliography: Sloane, Cat. Pl. Jamaic. 2: 137, pl. 166, fig. 2 & 3. 1696; L., Hort. Upsal., ed. 1, 181. 1745; P. Mill., Gard. Dict., ed. 6, *Volkameria* (1752) and ed. 7, *Volkameria*. 1759; L., Sp. Pl., ed. 2, 889. 1763; P. Mill., Gard. Dict., ed. 8, *Volkameria*. 1768; P. Browne, Civil Nat. Hist. Jamaic., ed. 2, imp. 1, 214 & 262--263, pl. 21, fig. 1, & pl. 30, fig. 2. 1789; Kostel., Allg. Med.-pharm. Fl. 3: 380--382. 1834; Lindl., Edwards Bot. Reg. 24; pl. 41. 1838; D. Dietr., Syn. Pl. 3: 372 & 615--618. 1843; W. Griff., Itin. Notes [Posthum. Papers 2:] 34. 1848; Hook. f. & Benth. in W. Hook., Niger Fl. 486. 1849; Van Houtte, Fl. Serres, ser. 1, 9: 18. 1853; Miq., Fl. Ind. Bat. 2: 1083. 1859; C. Muell. in Walp., Ann. Bot. Syst. 5: 711. 1860; Miq., Fl. Ind. Bat. Suppl. 1: 242. 1861; Firminger, Man. Gard. India, ed. 3, 326--327, 524, 528--530, & 609. 1874; Benth. in Benth. & Hook. f., Gen. Pl. 2 (1): 632 (1876) and 2 (2): 1156. 1876; Carr., Rev. Hort. 47: 80. 1876; Blanco, Fl. Filip., ed. 3, 1: 14 & 292 (1878) and ed. 3, 6: pl. [222]--225. 1878; Vidal y Soler, Phan. Cuming. Philip. 21, 53, 55, 62, 64, 74, & 135. 1885; Anon., Gard. Chron. 60 [ser. 2, 26]: 689 & 691. 1886; Maxim., Mél. Biol. 12: 486, 487, & 516--522. 1886; Vidal y Soler, Rev. Pl. Vasc. Filip. 211. 1886; Baill., Hist. Pl. 11: 87, 92, 94, 95, 112, & 114--116, fig. 98--100. 1891; Ceron, Cat. Pl. Herb. Manila 133. 1892; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 133, 135, 144, 170, & 173--175, fig. 65. 1895; Boorsma, Meded. Lands Plant. 31: 7 & 122. 1899; Diels, Engl. Bot. Jahrb. 29: 549. 1900; Durand & De Wild., Compt. Rend. Soc. Bot. Belg. 39: 75. 1900; Durand & DeWild., Mat. Fl. Congo 22. 1900; Gürke, Engl. Bot. Jahrb. 18: 176--177, 192, & 292. 1900; Hiern, Cat. Afr. Pl. Coll. Welw. 4: 839--843. 1900; H. H. W. Pearson, Kew Bull. Misc. Inf. 1901: 142. 1901; K. Schum., Justs Bot. Jahresber. 28 (1): 495 & 496. 1902; Usteri, Beitr. Ken. Philip. Veg. 123. 1905; Brandis, Indian Trees, imp. 1 & 2, 502 & 506--508. 1906; Nieuwenhuis, Ann. Jard. Bot. Buitenz. 21: 24, 29, & 258--259, pl. 29, fig. 44, 45, & 77--79. 1907; DeWild., Ann. Mus. Cong. Belg. Bot., ser. 5, 3: 467--468. 1912; Diels, Notes Roy. Bot. Gard. Edinb. 7: 332 & 349. 1913; J. K. SmaLL, Fl. Southeast. U. S., ed. 2, 1363. 1913; Gibbs, Journ. Linn. Soc. Lond. Bot. 42: 123. 1914; Léveillé, Fl. Kouy-Tchéou 371 & 442. 1914; Holland, Kew Bull. Misc. Inf. Addit. Ser. 9 [Useful Pl. Nigeria 3] 3: 523--525. 1915; W. W. Sm., Notes Roy. Bot. Gard. Edinb. 8: 315 & 320--321. 1915; P. C. Standl., Torreya 15: 9. 1915; Backer, Tropische Natuur 5: 87 & 93. 1916; Heyne, Nutt. Plant. Ned. Ind., ed. 1, 4: 119--122 & xxii. 1917; Léveillé, Cat. Pl. Yun-Nan 277. 1917; Brandis, Indian Trees, imp. 4, 502 & 506--508. 1921; Fedde & Schust., Justs Bot. Jahresber. 43: 158. 1922;

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Pharmacog. Titles 9 (1): vi. 1974; Gibbs, Chemotax. Flow. Pl. 3: 1752--1755 (1974) and 4: 2080. 1974; Malaisse in Lieth, Phenol. Season. Model. 276 & 438. 1974; Wilder, Frag. Gard. 208, 263, & 386. 1974; [Farnsworth], Pharmacog. Titles 7, Cum. Gen. Ind. [31]. 1975; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 49. 1975; Kooiman, Act. Bot. Neerl. 24: [461]--465. 1975; Molina R., Ceiba 19: 96. 1975; Jaeger, Marcellia 39: 15--19, fig. 1--4. 1976; López-Palacios, Revist. Fac. Farm. Univ. Andes 17: 42--43. 1976; Lewis & Elvin-Lewis, Med. Bot. 344, 347, 491, & 514. 1977; Mold., Phytologia 36: 28, 30, 33, 34, 37--39, 41, 42, 45, 48, 503, 510, & 512. 1977; Elias in Bentley & Elias, Biol. Nectaries 197, 243, & 245. 1983; Liogier & Martorell, Fl. Puerto Rico 152 & 309. 1983; Mold., Phytologia 57: 28, 32, 34--41, 157--161, 206--230, 303--310, & 334--364. 1985.

CLERODENDRUM ACERBIANUM (Visiani) Benth.

Additional bibliography: Mold., Phytologia 57: 339, 344, 350, 351, 354, & 365. 1985.

An erect or scrambling shrub, to 3 m. tall; branches and branchlets woody, stramineous, densely pubescent or short-tomentose; leaves rather small, opposite to ternate or quaternate, the lower ones largest; petioles short; leaf-blades narrowly lanceolate or ovate to oblong-elliptic or elliptic, 2.5--7.5 cm. long, apically acute or acuminate, marginally entire, basally rounded or subcordate to cordate, pubescent on both surfaces but especially beneath, softly villous on the venation; inflorescence composed of dense axillary and terminal pedunculate cymes; peduncles about as long as the petioles; bracts linear, about as long as the calyx; calyx campanulate, about 18 mm. long, externally densely pubescent, the tube short, the lobes lanceolate or linear-lanceolate, about as long as the tube, apically acute; corolla hypocrateriform, white, the short tube about 2.5 cm. long, externally pubescent, the lobes oval-oblong or ovate, flat, about 4 mm. long, subequal; stamens about 1.2 cm. long, long-exserted; fruit drupaceous, globose, about 8 mm. long and wide, the pericarp very thick and bony, externally covered with numerous irregular sulcations and lobules or spongy processes "so that it resembles a bramble", separating with difficulty into 2--4 pyrenes.

The type of this species, so designated by Thomas (1936), is *Kotschy 359* from Mograd, in the province of Berber, Nubia. The type of *Clerodendron holstii* Gürke is *Holst 3208* from Usambara in the Tanganyika portion of Tanzania, differing only slightly in having the leaf-blades more narrow and more lanceolate or oblong-elliptic.

Collectors have encountered this plant along the banks of the Nile and report the vernacular names "bagni beret", "mkwambe", and "mtozatoza".

Bentham (1876) notes that this plant is a "species Nubica insignis fructus pericarpio crassissimo osseo extus sulcis numerosis vario rugoso quasi in lobulos oblongos irregulares discriminato vix nisi in pyrenae 2--4 separabili". In this connection is it worth noting that most writers credit to "Benth. & Hook. f." this binomial and other binomials in this family published in Bentham & Hooker's classic Genera Plantarum, but Bentham in Journ. Linn. Soc. Lond. Bot. 20: 304--308 (1883), in his paper entitled "On the joint and

separate work of the authors of Bentham and Hooker's Genera Plantarum", states definitely that the portion dealing with the present family was written solely by him -- hence I accredit the names to him alone.

Gürke (1895) places this species in the Subgenus *Cornacchinia* (Savi) Briq., which he treats as a Section, and doubtfully adds to the Section *C. eriophyllum* Gürke and *C. trichol*obum Gürke, admitting that the fruit of the two latter taxa was still unknown to him, but "die beiden Arten stehen jedoch *C. acerbiana* habituell so nahe, dass sie am besten hier ihren Platz finden."

Baker (1900) cites for *C. acerbianum* from Nubia *Ehrenberg s.n., Kotschy 359, Kralik s.n., Letourneux 292, Petherick s.n., Raddi s.n.*, and *Schweinfurth 1055 & 1092*. He tells us that the type locality, Mograd, is actually an island by that name in the Nile. Hutchinson & Dalziell(1931) cite *Pirie 46* from the Gambia.

Junell (1934) notes that "In die Plazenten dringen seichte Furchen ein. Die mittleren Partien der Fruchtblätter sind nur ganz wenig verdickt."

Thomas (1936) cites the following collections seen by him in the preparation of his monograph of the African members of this genus: EGYPT: *Ehrenberg s.n., Kralik s.n., Letourneux 292, Schweinfurth 118.* SUDAN: *Baker 238 & 379, Kotschy 359, Pfund 443 & s.n., Schweinfurth 1055 & 1092.* KENYA: *Ellenbeck 2298.* TANGANYIKA: *Holst 3208, Schlieben 5866.* The last-mentioned of these collections is now regarded by me as *C. lindiense* Mold. Thomas avers that *C. acerbianum* occurs also in (Italian) Somaliland. The Egyptian collections which he cites are actually all from Nubia.

Parsa (1949) includes the species in his Flora of Iran, but notes that it is a "Plante d'Egypte dont l'existence est douteuse en Iran." I have never seen any material of it from Iran and also doubt that it occurs there.

Glover (1947) comments that "The authority for *Clerodendron acerbianum* is Benth. and Hooker according to Chiov. Fl. Somal. Vol. II, but according to F. T. A. Vol. V Boiss. is the authority." Boissier, however, did not make the combination until 1879; Bentham made it in 1876.

Berhaut (1967) reports the species from Sénégal, on the basis of his *no. 794*. Huber (1963) cites *Berhaut 794* from Sénégal, *Pirie 46* from the Gambia, and *Esp. Santo 2707* from Portuguese Guinea. He gives the species' overall distribution as "Widespread through Egypt, Sudan, and the drier parts of East Africa from Somaliland to Tanzania". Cufodontis (1962) lists it from Ethiopia, Sudan, Nubia, Egypt, and Touata Island (in the Juba River). He reports the additional vernacular names "bagniberet", "bagni-beret", and "jésomin".

Dale and Greenway (1961) cite from the coastal and Garissa districts of Kenya: *Battiscombe 229, Graham 2237, Hornby 3103*, and *Warner 997*.

Täckholm & Boulos (1974) aver that the species occurs in only one locality in Egypt -- "close to the Nile at Qotteira near Gebl Silsila N of Kom Ombo....It has been growing there since at least the beginning of the last century. It was described and pictured by Visi-

ani in 1836 from material collected by G. Acerbi (Italian consul in Egypt, died 1846).....It was again collected from the same place by A. Figari, A. H. Husson, G. Schweinfurth etc. and by V. Täckholm in 1961.....[It] has later been discovered outside Egypt in the upper Nile region." Schlechtendal (1840) cites "Mem del prof. Cav. G. Savi (p. 179." Montesir & Hassib (1956) list it from the Arabian Desert. It is worth noting here that the Täckholm & Boulos reference quoted above is sometimes cited as "1972", the titlepage date, but the work was not actually published until November 20, 1974. Similarly, the Boissier (1879) reference in the bibliography above is sometimes cited as "1875".

The *Letourneux 292* collection, cited below, is labeled as collected in "Egypt". *Schlieben 5866*, from Tanganyika, distributed as *C. acerbianum*, is now regarded as the type collection of *C. lindiense* Mold.

Citations: EGYPT: *Savi s.n.* [1835] (S); *Täckholm, Kassas, Samy, Girgis, & Zahran s.n.* [5/3/1961] (Gz, Gz), *s.n.* [11/2/1964] (Gz, Gz, Gz, Gz). SUDAN: Nubia: *Ellenberg s.n.* (L); *Herb. Koenpreuss s.n.* (L); *Kotschy 359* (Br--isotype, Du--166596--isotype, L--isotype, L--isotype, Ld--photo of isotype, Mu--766--isotype, Mu--767--isotype, N--isotype, N--photo of isotype, S--isotype, Vt--isotype); *Kralik s.n.* [1 Fév. 1848] (Du, Ld--photo, N--photo, S); *Letourneux 292* (Io, L, S), *s.n.* [16 mars 1881] (Du); *Paul Duke of Würtemberg s.n.* [Hambak, 1839] (Mu--1609), *s.n.* [Mokrat, 1839] (Mu--1610); *Schweinfurth 1055* (S). TANZANIA: Tanganyika: *Holst 3208* (Mu--1744). KENYA: *Sangai EA.15596* (Mu).

CLERODENDRUM ACULEATUM (L.) Schlecht., Linnaea 6: 750--751. 1831 [not *Clerodendron aculeatum* Millsp., 1940].

Synonymy: *Paliuro affinis ligustrifolia spinosa, flore monopetalo difformi, fructo sicco subrotundo* Sloane, Cat. Pl. Jamaic. 137, pl. 166, fig. 2 & 3. 1696. *Ligustrum aculeatum, fructu testiculato* Plum., Cat. Pl. Amer. 17. 1703. *Ligustroides* Houst. ex L., Hort. Cliff. 489. 1738. *Volkameria ramis spinulis* L., Hort. Upsal., ed. 2, 181. 1748. *Volkameria aculeata* L., Sp. Pl., ed. 1, imp. 1, 2: 637. 1753. *Clerodendrum fruticosum, spinosum, foliis inferioribus confertis superioribus obpositis, pedunculis tripartitis, trifloris, alaribus* P. Br. ex Plum., Pl. Amer. 1: 156 in syn. 1755. *Douglasia spinosa, ligustrifolia* Amm. ex Plum., Pl. Amer. 1: 157 in syn. 1755. *Paliuro affinis ligustrifolia, spinosa, flore monopetalo difformi* Sloane apud Plum., Pl. Amer. 1: 157 in syn. 1755. *Volkameria spinis petiolorum rudimentis* L. ex Plum., Pl. Amer. 1: 156 in syn. 1755. *Clerodendrum fruticosum, spinosum; foliis inferioribus confertis, superioribus oppositis; pedunculis tripartitis, trifloris, alaribus* P. Browne, Civil. Nat. Hist. Jamaic., ed. 1, 262. 1756. *Paliuro affinis, ligustrifolia, &c.* Sloane apud P. Browne, Civil Nat. Hist. Jamaic., ed. 1, 262 in syn. 1756. *Volkameria, spinis petiolorum rudimentis* L. apud P. Browne, Civil Nat. Hist. Jamaic., ed. 1, 262 in syn. 1756. *Volkameria spinis petiolorum rudimentis* L. ex P. Mill., Gard. Dict., abrdgd. ed. 5, *Volkameria* 1. 1763. *Clerodendrum fruticosum spinosum, foliis inferioribus confertis, superioribus oppositis, pedunculis tripartitis trifloris alaribus* P. Browne apud N. L. Burm.,

Fl. Indica 136 in syn. 1768. *Duglassia spinosa ligustri folio* Amman apud N. L. Burm., Fl. Indica 136 in syn. 1768. *Paliuro affinis ligustrifolia spinosa, flore monopetalo difformi* Sloane apud N. L. Burm., Fl. Indica 136 in syn. 1768. *Volkameria (aculeata) spinis petiolorum rudimentis* L. apud N. L. Burm., Fl. Indica 136. 1768. *Clerodendrum fruticosum spinosum, foliis inferioribus confertis; superioribus oppositis, pedunculis tripartitis alaribus* P. Browne apud Gaertn., Fruct. Sem. Pl. 1: 267 in syn. 1788. *Volkameria spinis petiolorum rudimentis* Jacq. apud Gaertn., Fruct. Sem. Pl. 1: 267 in syn. 1788. *Douglassia* Houst., Reliq. Houst. p, pl. 13. 1794. *Duglassia spinosa, ligustrifolio* Amman apud Poir. in Lam., Encycl. Méth. Bot. 8: 687 in syn. 1808. *Paliuro affinis, ligustrifolia, spinosa, flore monopetalo, difforme* Sloane apud Poir. in Lam., Encycl. Méth. Bot. 8: 687 in syn. 1808. *Volkameria foliis oblongis, acutis, integerrimis; spinis & petiolorum rudimentis* Willd. ex Poir. in Lam., Encycl. Méth. Bot. 8: 687 in syn. 1808. *Volkameria spinis & petiolorum rudimentis* L. ex Poir. in Lam., Encycl. Méth. Bot. 8: 687 in syn. 1808. *Volkameria aculeata* Willd. ex Pers., Sp. Pl. 3: 363. 1819. *Clerodendrum aculeatum* L. apud Schlecht., Linnaea 6: 750. 1831. *Clerodendron aculeata* J. Grah., Cat. Pl. Bomb. 157. 1839. *Clerodendron aculeata* L. ex J. Grah., Cat. Pl. Bomb. 157. 1839. *Volkameria aculeata* Spreng. apud J. Grah., Cat. Pl. Bomb. 157 in syn. 1839. *Clerodendron aculeatum* J. Grah. ex Voigt, Hort. Suburb. Calc. 467. 1845. *Clerodendron aculeatum* (L.) Griseb., Fl. Brit. W. Indies 500. 1861; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a); 175. 1895. *Clerodendron aculeatum* var. *grandifolium* Kuntze, Rev. Gen. Pl. 2: 505. 1891. *Clerodendron aculeatum* var. *parvifolium* Kuntze, Rev. Gen. Pl. 2: 505. 1891. *Ligustrodes* L. ex Kuntze, Rev. Gen. Pl. 2: 505 in syn. 1891. *Ovieda aculeata* (L.) Baill., Hist. Pl. 11: 45. 1891; Mold., Prelim. Alph. List Inv. Names 33 in syn. 1940 [not *O. aculeata* Klatt., 1863]. *Clerodendron aculeatum* Griseb. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 560. 1893. *Ovieda aculeata* (L.) A. S. Hitchc., Ann. Rep. Mo. Bot. Gard. 4: 118. 1893. *Volkameria aculeata* Sessé & Moc., Fl. Mex., ed. 2, 151--152. 1894; Mold., Prelim. Alph. List Inv. Names 18 in syn. 1940. *Clerodendron aculeatum* Schlecht. ex Duss, Ann. Inst. Colon. Marseille 3: 467. 1897. *Ovieda aculeata* Hitchc. apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 307. 1903. *Clerodendron aculeata* Woodrow, Gard. Trop., ed. 1 [Gard. India, ed. 6], 437. 1910; Mold., Phytologia 31: 395 in syn. 1975. *Clerodendron aculectum* Gr. ex Goyena, Fl. Nicarag. 1: 567 in syn. 1911. *Clerodendron aculeatum* (L.) Schlecht. ex Urb., Symb. Antill. 4: 538. 1911. *Ovieda aculeata* Baill. apud Urb., Symb. Antill. 4: 538 in syn. 1911. *Volkameria aculeata* Einn. ex Goyena, Fl. Nicarag. 1: 567 sphalm. 1911. *Clerodendron longicollis* Borgeson & Paulsen ex Britton & P. Wils., Scient. Surv. Porto Rico 6: 150 in syn. 1925 [not *C. longicolle* G. F. W. Mey., 1818]. *Clerodendrum aculeatum* (L.) Griseb. ex B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 90 & 92. 1936. *Clerodendron aculeatum* var. *grandiflorum* Kuntze ex Mold., Prelim. Alph. List Inv. Names 18 in syn. 1940. *Clerodendron aculeatum* var. *grandifolia* Kuntze ex Mold., Prelim. Alph. List Inv. Names 18 in syn. 1940. *Clerodendron aculeatum* var. *parvifolia* Kuntze ex Mold., Prelim. Alph. List Inv. Names 18 in

syn. 1940. *Ligustrum aculeatum fructu testiculosa* Plum. ex Mold., Prelim. Alph. List Inv. Names 30 in syn. 1940. *Ligustroides* L. ex Mold., Prelim. Alph. List Inv. Names 30 in syn. 1940. *Paliuro-affinis ligustrifolio spinosa* Sloane ex Mold., Alph. List Inv. Names 33 in syn. 1940. *Ligustrum aculeatum* Plum. ex Mold., Alph. List Inv. Names Suppl. 1: 13 in syn. 1947. *Clerodendrum aculeatum* var. *aculeatum* Alain in Leon & Alain, Fl. Cuba, imp. 1, 4: 320. 1957; Mold., Fifth Summ. 1: 460 in syn. 1971. *Clerodendrum aculeatum* var. *aculeatum* [Alain] ex Mold., Résumé 271 in syn. 1959. *Clerodendron volkameria* Harler, Gard. Plains, ed. 4, 159. 1962. *Clerodendron volkameria* Linn. ex Malaviya, Proc. Indian Acad. Sci. B.58: 352. 1963. *Clerodendron volkemeria* Linn. ex Malaviya, Proc. Indian Acad. Sci. B.58: 357. 1963. *Clerodendrum aculeatum* Griseb. ex Sen & Naskar, Bull.Bot. Surv. India 7: 40. 1965. *Clerodendrum aculeata* (L.) Schlecht. ex Mold., Résumé Suppl. 17: 8 in syn. 1968. *Volcameria aculeata* L. ex Pierre-Noel, Nom. Polyglot. Pl. Hait. 470 in syn. 1971. *Clerodendrum aculeatum* (L.) Garcke ex Mold., Phytologia 28: 455 in syn. 1974. *Clerodendon aculeatum* Woodrow ex Mold., Phytol. Mem. 2: 384 in syn. 1980. *Clerodendrum acuelatum* (L.) Schltr. ex Mold., Phytologia 57: 38 in syn. 1985. *Volkameria spinosa* Rottböll, in herb. [not *V. spinosa* A. L. Juss., 1806].

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A spiny, often vine-like, sprawling or trailing, to rarely erect shrub, occasionally arborescent and to 6.5 m. tall and with a trunk 0.9--3.5 m. long, slow-growing, leafy, much-branched, the branches sometimes to 10 m. long when sprawling; branches, branchlets, and twigs long, slender, stiff, subterete or obtusely and obscurely tet-

ragonal, solid, gray or brownish, more or less softly appressed-pubescent or puberulent, glabrate in age, lenticellate, spinose, the branches to 2.5 cm. in diameter, the very slender twigs minutely hairy; nodes not annulate; principal internodes 0.5--5.5 cm. long;; spines small, 2--8 mm. long, opposite or ternate, borne at and subtending the nodes, conic, somewhat recurved, formed by the persistent basal part of the petiole of the primary leaves; bark light-gray, thick, rough, furrowed; leaves numerous, the upper ones decussate-opposite or approximate, the lower ones ternate, seemingly attached on the upper side of a spine near or at its apex, sometimes clustered on reduced lateral twigs, often with fascicled ones in their axils; petioles of the primary leaves slender, issuing from a very stout, ampliate, and ligneous spinescent base, 3--11 mm. long, more or less puberulent, eventually breaking off obliquely 1/3 to 1/2 the distance from the apex to base, the base persisting as a sharp, stout, subulate-tipped spine, the petioles of the small fascicled leaves which are often borne in the axils of the spines obsolete or very short and not spinescent; leaf-blades chartaceous, oblong or elliptic to elliptic-obovate or oblong-elliptic to ovate, lanceolate, or elliptic-lanceolate, 0.9--9 cm. long, 0.3--4 cm. wide [the larger, wider ones typical of var. *grandifolium* Kuntze], apically narrowed and blunt or acute to acuminate and usually slightly mucronulate, marginally entire, basally narrowed and acute or cuneate, glabrous or subglabrous and usually shiny (rarely dull) on both surfaces, densely and deeply punctate beneath due to deeply sunken peltate glands, the upper surface darker green and the lower surface light-green, sometimes becoming brunnescent above in drying; midrib slender, flat or very slightly prominulent above, prominulent beneath, sometimes abaxially and adaxially puberulent beneath on very young leaves; secondaries 4--8 pairs, short and very slender, ascending; vein and veinlet reticulation very fine and delicate, obscure on both surfaces or almost indiscernible above; inflorescence axillary, pedunculate, crowded at the apex or upper nodes of the branchlets and twigs, few-flowered; cymes solitary in or slightly above the axils of the spines, opposite or ternate, 2--6 cm. long, 1.5--5 cm. wide, loosely 3--7-flowered, generally thrice trichotomous; peduncles very slender, 1--2.8 cm. long, densely puberulent, sometimes becoming spinescent; pedicels very slender, 2--14 mm. long, branched, densely puberulent, not much thickened in the fruiting stage; flowers slightly sweet-scented, cymose, slightly zygomorphic; calyx tubular or campanulate, membranous, green, 3--8 mm. long, externally pubescent or puberulent, 5-lobed to almost half the length, the lobes ovate or triangular-ovate, 2--3 mm. long, apically acute to caudate-acuminate, spreading or reflexed; corolla hypocrateriform or infundibular, white or whitish, externally minutely resinous-punctate, its tube slender or very slender, 1.5--2.2 cm. long, the limb 5-lobed, 1.2--1.5 cm. wide in anthesis, the lobes oblong, 6--8 mm. long, apically acute, shorter than the tube; stamens 4, attached in the corolla-tube in somewhat unequal pairs; filaments filiform, unequal, whitish or purplish to purple, much exserted, 2.5--3.5 cm. long, widely spreading; anthers oblong, basally attached, 2-thecous, opening by longitudinal slits; style terminal, filiform, 3--3.1 cm. long,

purplish, much exserted and equaling the stamens; stigma bifid; ovary minute; fruiting-calyx cupuliform, spreading, 3--5 mm. long, 6--9 mm. wide, externally puberulent or granular-pulverulent and punctate, venose, its rim sharply 5-toothed or 5-lobed with triangulat-ovate lobes, deeply split in age; fruit drupaceous, subspheric or ovoid, 5--10 mm. long and wide or slightly broader than long, black or blackish, shiny, externally glabrous, conspicuously bilobed and 2-sulcate when young, in age 4-lobed and 4-sulcate, fleshy and juicy when young, nigrescent in drying, hairy and osseous when mature and then brunnescent in drying, splitting into two bilobed, brown, 2-seeded pyrenes or nutlets at maturity; seeds erect, solitary, oblong, without endosperm; chromosome number: n = 12.

This species is based on sheet 788/1 in the Linnean Herbarium in London. Kuntze (1891) distinguishes his var. *grandifolium* as having its leaves 2--4 cm. long and 1--3 cm. wide, while his var. *parvifolium* has them only 0.5--1.5 cm. long and about 0.25 cm. wide, both from St. Thomas. He writes the varietal names "*grandifolia* " and "*parvifolia*" as was the custom of writers who thought varietal epithets must agree in gender to the Latin "varietas". Actually his small-leaved variety corresponds to the typical form of the species, while the *Acuña 15631* collection, cited below, exhibits leaf-blades which are ovate and as much as 5 cm. long and 3 cm. wide; other collections have been seen with the blades to 9 cm. long and 4 cm. wide.

Collectors describe the species as a dense, bushy, spiny, scandent shrub or shrubby tree or arching, spreading, woody vine, 0.8--3 m. tall, the main stems to 15 cm. in diameter, with short recurved spines to 2.5 cm. in diameter at the base, the branches elongate and arching, the branches issuing in decussate-opposite fashion at right angles to the branch, the bark thick, light-gray, rough, and furrowed, the leaf-blades dark-green and glossy, minutely punctate, the flowers showy, varying from fragrant to slightly so or even inodorous, the stamens red, declined, the filaments exserted, purple or purplish to red-purple, light-purple, purple-magenta, or rose, the anthers purple, the fruit small, at first green, then dull-yellow, finally black, drupaceous, compressed, 4-grooved, composed of 4 nutlets.

Collectors have found the plant growing in secondary dry woodlands, swamplands, thickets, open ground, hedgerows, coastal thickets, dry scrub areas, dry wooded limestone areas, open grasslands, and beachside forests, in roadside hedges, on arid zone beaches or close to them, on dry rocky hills, and on low probably inundated ground along shores, on beaches, in dry scrub woodlands mixed with *Coccoloba uvifera* along seacoasts, at the edges of coppices, in moist coastal forests, on rocky headlands and steep dry slopes, from sealevel to 750 m. altitude, in flower throughout the year, and also in fruit in every month of the year.

Egler reports that in Martinique it is locally very common in open sites but "perhaps a recent introduction here". It was long ago introduced into India's drier areas as a sand-binder and the Drummond collections, cited below, are from the Booti jungle in the Karnál district, collected in 1887. *Funck & Schlim 31*, often cited from Venezuela, actually was collected on the island of Guadalupe in the

West Indies. Sauer reports it on the "edge of largely bare rock in the spray zone on 15 m. high windswept limestone headlands" in the Barbados, a photograph of the habitat accompanies his *no. 2203* collection. Mareano refers to it as an "uncommon shrub" on Saona island, while Wilbur and his associates describe it as "common" or "abundant" on Dominica. D'Arcy avers that it is "plentiful in weed patches" on Tortola, but Fosberg found it to be "rare in coastal scrub vegetation on coral limestone terraces" on St. Croix. In Puerto Rico Liogier & Martorell (1983) report the plant "Locally common in moist and dry coastal thickets and forests; also in tidal areas near sea level", giving its overall distribution as "West Indies south to Barbados, continental Tropical America, introduced into Bermuda." Miss C. F. Morrow describes it as a "wayside weed in hedges and on walls" in St. Thomas. Combs reports that in Cuba it is "common in rocky savannahs at the sources of streams, etc." According to List Pl. Atkins Inst. 59 (1933) it is also cultivated in Cuba. Britton & Cowell refer to it as "climbing on small trees" on St. Croix. On the islands of Antigua, Guadalupe, and Martinique Duss tells us that it becomes a very bushy shrub, 1--3.5 m. tall, growing in clumps on seashores where the soil is sandy or pebbly and is there very abundant. Other collectors remark that the plant is quite ornamental and "common in its range, especially in littoral areas". Duss cites his *nos. 1968* and *2387*.

Ekman (1929) affirms that *C. aculeatum* is found on dry hillsides throughout Haiti; Woodbury & Little (1976) record it from Buck island in the Virgin Islands; Grisebach (1857) knew it from Guadalupe, St. Thomas, St. Croix, and Martinique. Schlechtendal (1831) and Knuth (1927) list it from St. Thomas; Millspaugh (1896, 1898, 1902) cites *Eggers 666* and *Mrs. R. L64* from St. Thomas, as well as *Schott 27* from Mérida (Mexico) and *736* & *875* from Izamal, these probably actually *C. ligustrinum* (Jacq.) R. Br.

Gooding and his associates (1965) affirm that this species is a "common shrub of dry soils, sea cliffs, etc." on Barbuda, citing *Herb. Barbados Mus. 223*; Harris (1965) reports that it is "browsed only by goats in the evergreen woodlands" of that island. Reis & Lipp (1983) cite *Smith & Smith 936* from St. Vincent, *Fishlock 250* from the British Virgin Islands, and *Kings 148* from "Brit. W. I." The Smiths report that on St. Vincent it is "common in secondgrowth" and is used for hedges -- "Very probably an introduced species."

Box, in his apparently unpublished manuscript "Flora of Antigua", cites *Douglas s.n.* in the Herb. Sloane, vol. 162, fol. 226, deposited in the British Museum, *Duss 11* in the U. S. National Herbarium, *Hanstein s.n.* in the Berlin herbarium, *Nicholson s.n.* in the Kew herbarium, and *Wullschlägel 422* [Herb. Monac. 770] in the Munich herbarium, as well as *Box 974* -- all from Antigua, and *Gregory s.n.* in the British Museum herbarium from Barbuda. He comments that the species grows in "Open xerophytic bushlands, roadside hedges, often forming dense thickets in the limestone region of Antigua and in cleared bushlands in Barbuda. Frequent and widely distributed in the lowlands." Wheeler (1916) also lists it from Antigua, where, he says, the flowers are "beloved of hummingbirds".

Browne (1789) says "This thorny shrub is one of the most common plants in the low lands of Jamaica: it grows in a dry gravelly soil, and seldom rises above five or six feet in height. It is very common in most of the other sugar-lands, as well as in that island." Raeuschel (1797) accredits the species only to Jamaica and Barbados. Adams (1972) tells us that in Jamaica it is "Frequent on limestone rocks, sand dunes and gravelly wastes, mostly near the sea, sealevel to 800 ft. alt.; fl. June--Feb., *Adams 9441*, *Harris 10792*, *Proctor 11255*, "Bermuda, Bahamas, Mexico to Venezuela and the Guianas, West Indies mostly in the drier islands; Grand Cayman; introduced into Senegal, Guinea and Gambia."

Urban (1911) cites *Krug 896*, *Read s.n.*, *Sintenis 579*, *579b*, & *596c* and *Stahl 882* & *882b* from Puerto Rico, listing the species also from Cuba, Jamaica, Cayman Islands, Hispaniola, Culebras, St. Thomas, St. Croix, St. Jan, Anguilla, St. Martin, St. Bartholomew, Saba, St. Eustache, St. Kitts, Antigua, Guadalupe, Dominica, Martinique, St. Vincent, Bequia, Mustique, Barbados, Yucatan, and South America.

Little and his associates (1974) report the species "Locally common in moist and dry coastal thickets and forests and tidal areas near sea level" in Puerto Rico from Fajardo to Cabo Rojo; "Also, islands eastward, including Icacos, Piñeros, Culebra, Vieques, St. Croix, St. Thomas, St. John, Jost van Dyke, Tortola, Virgin Gorda, and Anegada". They give its overall range as "West Indies from Bahamas through Greater Antilles and Lesser Antilles from St. Martin and St. Barts south to St. Lucia and Barbados. Planted in Trinidad and Tobago and naturalized in Bermuda. Also Veracruz, Mexico, and along the coast from Venezuela to French Guiana. Introduced in Hawaii. Widely grown in tropical regions as a hedge plant and sand-dune binder along seashores."

López-Palacios (1977) cites only *Lasser 4272* as cultivated in Venezuela and the *Funck & Schlim 31* which, as noted above, was probably collected on Guadeloupe rather than in Venezuela. He describes the plant as "Un arbustico de cerca de tres metres, del que soló existen dos registros: una de Funck y Schlim 31 (G), sin lugar ni fecha, y otro de Lasser, del Jardin Botánico de Caracas, A pesar de su poca representacion en Venezuela, la especie se extiende desde México y Puerto Rico, pasando pos las Antillas, hasta la partie norte de la America del Sur; pero aqui parece que sólo tuviere ocurrencia en Venezuela y las Guayanas. Es bastante similar al *C. ternifolium*, del que difiere por sus acúleos más fuertas y por las hojas, que en la especie que tratamos son por lo general opuestas y en aquél ternadas, aunque en ambos se dan ejemplares con hojas opuestas; se diferencian también por su tamaño ('subbipollicaria' en *C. aculeatum* y 4--6 poll. en *C. ternifolium*). Además, el porto de este ultimo parece ser mayor."

Neal (1965) lists *C. aculeatum* as cultivated in the Hawaiian Islands. Graham (1839) says "It is a native of the West Indies, and was probably introduced [into India] by the late Lieut. Col. Hough, in whose garden on Colabah [Bombay] it is to be met with." Clarke (1885) also records it as cultivated in India, while Voigt (1845) reports it in cultivation in Calcutta as early as 1845.

Thomas (1936) cites *Toll s.n.* from Senegambia and *Schweinfurth s.n.*

from Egypt as cultivated or as naturalized after cultivation. Doubtless the species was there introduced as a sand-binder. Huber (1963) cites *Baldwin 5743*, *Chevalier s.n.*, & *Farmer s.n.* from Sénégal, as well as *Brunner 36* from cultivated material there, and *Esp. Santo 2276* from cultivation in Portuguese Guinea. From Zaire the labels accompanying *Germain 2057* bear the notation: "essence de savane, forme des petits buissons trés décoratifs; parait susceptible d'etre conduits en haie; introduit dans les collections de l'Isalowe sous le *no. 2960*".

Little and his associates (1974) report that *C. aculeatum* is sometimes seen as a hedge plant or climbing over walls on St. Thomas and elsewhere in the West Indies. A poultice is made from the leaves there and is used as a house remedy. Fishlock also notes its use as a medicine on Tortola; Broadway insists that it makes a very useful hedge plant on Trinidad and Tobago. Sweet (1826) avers that it was introduced into English gardens from the "W. Indies" in 1739.

Woodrow (1910) refers to it as useful for fences and topiary work in India, where Parker (1924) notes that it is cultivated in gardens on the plains of Punjab, being useful there as a hedge plant, "but is seldom used as such." In Pakistan, according to Jafri & Ghafoor, it is also sometimes used as a hedge plant. Hooker & Bentham (1849) list it as cultivated in Senegal. Grindal (1960) also found it useful as a hedge plant in India, but seldom so used. Burkill (1966) says: "It has been found very useful for hedges in the West Indies, and may be of service in Malaya". MacMillan (1962) reports its use for marking boundaries and borders or for making barriers. Reis & Lipp (1982) tell us that it can be used in the treatment of gonorrhea and that the leaves are in some places boiled aand the resulting decoction used as a cough remedy.

Felt (1909, 1917) reports that the flower-buds are sometimes galled by an itonid, *Asphondylia attenuata* Felt. In Puerto Rico the plant may be infested by flea-beetles, *Alagoasa bicolor*, *Cyrsylus volkameriae*, and *Omophoita cyanipennis*, and is host to one of the largest known leafhoppers, *Gypona portoricensis* Caldwell.

Burkill (1966) speaks of "small white or purple flowers", but all collectors who describe the flower color on the labels accompanying their collections, so f r seen by me, describe them as "white" -- probably it is the often purple stamen filaments and anthers to which Burkill is referring, not to the corollas.

Gaertner (1788) describes the fruit as follows: "PER. Bacca subrotunda, exsucca, tetracollis, quadrisulca, nitida, dipyrena, bifariam secedens. Ossicula duo cartilaginea, obcordata, hinc convexa, sulco medio inscripta, inde plana, glabriuscula, bilocularia. REC. nullum; semina basi loculamentorum affixa. SEM. solitaria, ovato oblonga, hinc convexa, inde subangulata, rufescentia. INT. duplex, utrumque membranaceum, tenue. ALB. nullum. EMB. semini conformis, erectus, albus. Cotyl. carnosae, plano convexae. Rad. minima, conica, infera."

Siegert (1970) describes the thorn of *C. aculeatum* as follows: "Abschliessend seien noch zwei weitere Beispiele für Blattstieldornen aus den Bereich der Tubifloren, nämlich *Clerodendrum aculeatum* Gr. (*Verbenaceae*) und *Cantua buxifolia* (*Polemoniaceae*) erwähnt. Ersterer

Art, auf die Troll 1939, S. 1234 aufmerksam macht, wirft die Blätter ihrer Langtriebe -- die Kurztriebblätter sind auch hier zur Dornerzendung nicht befähigt. -- nach dem Modell von *Quisqualis* ab (vgl. auch Grisebach). Die Trennung des Stieles erfolgt enlang einer schräg verlaufenden Einschnürung.....Die abfallende, nur wenig verhärtete Stielpartie sitzt der verbleihenden, stark mechanischen Eigenschaften durch die Zellwandverdickungen des peripheren und mittleren Rindengewebes -- nur um das zentral gelegene Leitgewebe bleibt eine schmale Zone schwandiger Parenchymelemente."

Pitard (1901) reports the existence of "a composite and interrupted ring of sclerenchyma in the pericycle" of *C. aculeatum*. Malaviya (1963) asserts that stone-cells are absent in what he calls *C. volkameria* and are present in the stems and petioles of *C. aculeatum* and are absent from the lamina but present in the basal part of the midrib, distributed either singly or in groups of 2 to many in the cortex of a sufficiently old stem in which the secondary tissues have already been produced. They are brachysclereids, but their shape and structure more similar to the 'spheroidal sclerids' of T. A. Rao (1957) with very prominent pit-canals, but a non-lamillated wall. It is a collenchyma cell in the cortex of the stem which gets transformed into a stone-cell.

Ramji & Parameswaran (1961) have studied the ontogeny of the vegetative axillary buds of *C. aculeatum* and report that their "meristem is differentiated just before a leaf primordium arises over the vegetative apex by the formation of a weakly marked shell zone. Three tunica layers with a core of cells underneath continue into the axillary bud meristem. As soon as the initials are delimited, they undergo vacuolation just like the surrounding cells. Activity in the concerned cells is perceptible after 2 or 3 plastochrons. Sometimes it may be delayed till 6 to 9 plastochrons. Also periclinal divisions occur in the third tunicate layer in the early stages of growth of the axillary bud primordium whereby contribution of cells to the corpus zone is effected. The axillary bud meristem, when it resumes activity, consists of heavily stained cells. The phenomenon of vacuolation, restricted to a few cells of tunica and corpus, characteristic of the adult species, occurs later in ontogeny. In origin the axillary bud of *C. aculeatum* speaks for the detached meristem concept. Procambrialization of the axillary bud primordium occurs initially at the central base of the prophyll. This procambium develops acropetally into the prophyll, and basipetally, during which process the intervening parenchymatous cells are transformed into procambium. This course of events is evident in buds that differentiate very late. However, an acropetal differentiation of procambium is noticed in axillary buds developing close to the primary vegetative apex. Variations have been found in xylem differentiation. Initial differentiation of protoxylem may generally be at the base of the prophyll from which it develops acropetally into the appendage and basipetally into the axis. However, variation has been observed from this mode of differentiation. Phloem seems to develop acropetally. The nodal situation is of the unilacunose type with a single trace to the leaf that trifurcates in the higher regions of the petiole. The bud trace and the leaf trace originate from the same gap."

Radlkofer (1886, 1890) describes in detail the transparent dots found on the leaf surface of this species, which he asserts are due to deeply sunken peltate glands in the leaf-tissue.

Bolkhovskikh (1969) and Cave (1964) report the chromosome number for this taxon to be 2n = 24 on the basis of Nevling (1963).

As stated previously in these notes, *Clerodendrum aculeatum* is typified by sheet no. 788/1 [809/1 in the Savage enumeration] in the Linnean Herbarium in London, inscribed "*Volkameria aculeata*" in Linneus' own handwriting. It is a species native only to the West Indies, cultivated and escaped elsewhere. It corresponds ecologically to the *C. inerme* (L.) Gaertn. of Asia and Pacifica, the *C. ligustrinum* (Jacq.) R. Br. and *C. pittieri* Mold. of Central America, and *C. molle* H.B.K. and *C. ternifolium* H.B.K. of South America, all of which it greatly resembles in habit and habitat.

The type of *Volkameria aculeata* Sessé & Moc. is their *no. 2181*. The type of *C. aculeatum* var. *grandifolium* Kuntze is *Kuntze 142* collected by Otto Kuntze in St. Thomas on March 22, 1874, deposited in the Britton Herbarium at the New York Botanical Garden, while that of *C. aculeatum* var. *parvifolium* Kuntze is *Kuntze 5546*, collected at the same time and place and also deposited in the Britton Herbarium.

Briquet (1895) makes *Clerodendrum aculeatum* the type of his monotypic Section *Volkameria* (L.) Briq., based on the fruit dehiscence, and in this he is followed by Junell (1934). Referring to this same character, Bentham (1876) comments: "*Volkameria*, Linn., inclusit species plures charactere vago a *Clerodendro* separatas, ab auctoribus recentioribus ad *V. aculeatam* limitatur, speceiem habitu plerisque notis *C. inermi*, *C. ligustrino* aliisque affinem sed pyrenis per paria cohaerentibus; in *C. inermi* tamen aliisque speciebus pyrenae per paria arcte contiguae sunt, dum in aliis lacunis v. mesocarpio succoso plus minus separatae, et Grisebach.....aptius *V. aculeatam* cum caeteris *Volkameriis Clerodendro* adjunxit."

The *Clerodendrum aculeatum* of Millspaugh, referred to in the synonymy of *Clerodendrum aculeatum* (L.) Schlecht., is a synonym of *C. ligustrinum* (Jacq.) R. Br.; *Ovieda aculeata* Klatt. is *Lapeirousia compressa* Pourr. in the *Iridaceae*; and *Volkameria spinosa* A. L. Juss. is *Rhaphithamnus spinosus* (A. L. Juss.) Mold.

The specimens from the Swan Islands, cited below, exhibit leaves with their blades more or less densely pulverulent above and very densely resinous-punctate beneath. *Northrup & Northrup 296* in the Columbia University Herbarium exhibits both the spines and the branchlets very conspicuously alternate-approximate rather than opposite. *Boldingh 637b* is remarkable for its elongate and very narrow leaf-blades (1.8--3.5 cm. long and only 3.5--6 mm. wide).

In very dry soil the internodes in *Clerodendrum aculeatum* tend to become very much abbreviated, the spines are therefore very numerous and situated close together but shorter, and the leaves are smaller. In more liberally watered soil the internodes tend to be more elongate, the spines larger and heavier, and the leaf-blades larger. This large-leaved form is well typified by *Fishlock 184*, *Heller 6122*, *Paulsen 283*, *Thompson 417*, *Lloyd 1733*, *Nash 1471*, *Trin. Bot. Gard. Herb. 11152 & 11834*, and *Wilbur & al. 8109*.

[to be continued]